

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of all claims in the application.

LISTING OF THE CLAIMS

Claims:

1. (Currently amended) A device for transporting printed circuit boards or foils in ~~conveyorized processing lines with a plane of transportation for the printed circuit boards or foils~~ conveyorized lines for wet-processing printed circuit boards and printed circuit foils, said device comprising the following features:

a) at least one pair of rollers that are disposed on a respective side of the plane of transportation and are facing each other for transporting the printed circuit boards or printed circuit foils, said rollers each having at least one elevation encircling said rollers, wherein said at least one pair of rollers includes at least one first roller located on one side of the plane of transportation and at least one second roller located on the other side of the plane of transportation, and

b) transport drives associated with said rollers,
wherein the elevations (7) on the first roller (1) of a pair of rollers located on one side of the plane of transportation (12) are staggered relative to the elevations (7) provided on the second roller (2) of the pair of rollers on the other side of the plane of transportation (12);

wherein said elevations are located along the plane of transportation in the region of the conveying path for contacting printed circuit boards or printed circuit foils; and

wherein there is provided at least one bordering elevation (9) at the end of the rollers (1, 2), said bordering elevation annularly encircling the respective one of the rollers (1, 2), and wherein said bordering elevations (9) are disposed on the rollers (1, 2) of a pair of rollers so as to face each other.

2. (Original) The device according to claim 1, wherein the elevations (7) annularly or helically encircle the rollers (1, 2).

3. (Previously presented) The device according to claim 1, wherein several axially spaced apart elevations (7) are provided on the at least one roller (1, 2).

4. (Previously presented) The device according to claim 1, wherein said at least one bordering elevation (9) at the end of the rollers (1, 2), has a diameter such and is disposed in such a manner that the work piece (4), which has a predetermined thickness, may only be deformed by particles (10) adhering to the rollers (1, 2) to the extent permitted by the elevations (7).

5. (Cancelled)

6. (Currently amended) The device according to claim 1, including spaced apart bearings (3, 5), wherein the minimum spacing between the rollers (1, 2) of a pair of rollers is set by the spacing between the bearings (3, 5) of the rollers (1, 2) to be such that the printed circuit boards or printed circuit foils (4) are not deformed beyond the size of the particles (10) adhering to the rollers (1, 2).

7. (Previously presented) The device according claim 2, wherein the spacings between the elevations (7) annularly encircling the rollers (1, 2) or the spacings between respective turns of the elevations (7) helically encircling the rollers (1, 2) are at least 10 % greater than the width of the elevations (7).

8. (Previously presented) The device according to claim 1, wherein the height of the elevations (7) ranges from 0.1 mm to 10 mm.

9. (Previously presented) The device according to claim 2, wherein the width of the elevations (7) as well as the spacings between the elevations (7) annularly encircling the rollers (1, 2) and the spacings between respective turns of the elevations (7) helically encircling the rollers (1, 2) may range from 2 mm to 200 mm.

10. (Currently amended) The device according to claim 4, wherein the rollers (1, 2) are lengthened by at least the length of the bordering elevations (9) at the ends of the rollers (1, 2) and are disposed in a processing line in such a manner that the bordering elevations (9) at the ends of the rollers (1, 2) are located outside of a useful area of a conveying path in the processing line occupied by the printed circuit boards or printed circuit foils (4).

11. (Previously presented) The device according to claim 1, wherein the elevations (7) have rounded front sides (8).

12. (Previously presented) The device according to claim 2, wherein the rollers (1, 2) are made from at least one material selected from the group comprising metal, plastic material and ceramics.

13. (Previously presented) The device according to claim 1, wherein the rollers (1, 2) provided with the elevations (7) are configured to be formed by axles

with rings secured thereon in such a manner that the rings are reliably prevented from slipping and twisting.

14. (Currently amended) A method of transporting printed circuit boards or printed circuit foils (4) in conveyORIZED wet-processing ~~processing~~ lines with a plane of transportation for the printed circuit boards or printed circuit foils (4) and with at least one pair of rollers (1, 2), said rollers facing each other and being disposed on a respective side of the plane of transportation for transporting the printed circuit boards or printed circuit foils (4), wherein said pair of rollers includes at least one first roller located on one side of the plane of transportation and at least one second roller located on the other side of the plane of transportation, the rollers (1, 2) having each at least one elevation (7) encircling the rollers (1, 2), the elevations (7) on the first roller (1) of a pair of rollers being staggered relative to the elevations (7) on the second roller (2) of the pair of rollers on the other side of the plane of transportation; and with transport drives associated with the rollers (1, 2), the printed circuit boards or printed circuit foils (4) being supplied to the rollers (1, 2) of the at least one pair of rollers in the plane of transportation, said rollers (1, 2) transporting and finally releasing them, wherein there is provided. at least one bordering elevation (9) at the end of the rollers (1, 2), said bordering elevation annularly encircling the respective one of the rollers (1, 2), and wherein said bordering elevations (9) are disposed on the rollers (1, 2) of a pair of rollers so as to face each other, and including the steps of providing printed circuit boards or printed circuit foils, and processing said printed circuit boards or printed circuit foils which are being transported with said at least one pair of rollers (1, 2) by applying a wet-chemical treatment to said printed circuit boards or printed circuit foils.

15. (Previously presented) The device according to claim 2, wherein several axially spaced apart elevations (7) are provided on the at least one roller (1, 2).

16. (Previously presented) The device according to claim 1, wherein the rollers (1, 2) are lengthened by at least the length of the bordering elevations (9) at the ends of the rollers (1, 2) and are disposed in a processing line in such a manner that the bordering elevations (9) at the ends of the rollers (1, 2) are located outside of a useful area of a conveying path in the processing line occupied by the workpieces (4).

17. (Currently amended) A device for transporting printed circuit boards or printed circuit foils in conveyORIZED ~~processing~~ lines with a plane of transportation for the workpieces for wet-processing of said printed circuit boards or printed circuit foils, said device comprising the following features:

a) at least one pair of rollers that are disposed on a respective side of the plane of transportation and are facing each other for transporting the printed circuit boards or foils, said rollers each having at least one elevation encircling said rollers, wherein said pair of rollers includes at least one first roller located on one side of the plane of transportation and at least one second roller located on the other side of the plane of transportation, and

b) transport drives associated with said rollers,
wherein the elevations (7) on the first roller (1) of a pair of rollers located on one side of the plane of transportation (12) are staggered relative to the elevations (7) provided on the second roller (2) of the pair of rollers on the other side of the plane of transportation (12),

wherein the elevations (7) annularly or helically encircle the rollers (1, 2);

wherein several axially spaced apart elevations (7) are provided on the at least one roller (1, 2); and

wherein, there is provided at least one bordering elevation (9) at the end of the rollers (1, 2), said bordering elevation annularly encircling the respective one of the rollers (1, 2), having a diameter such and being disposed in such a manner that the printed circuit boards or foils (4), which has a predetermined thickness, may only be deformed by particles (10) adhering to the rollers (1, 2) to the extent permitted by the elevations (7).

18. (Previously presented) The device of claim 1, including spaced apart bearings (3,5), wherein several axially spaced apart elevations (7) are provided on the at least one roller (1, 2);

wherein the minimum spacing between the rollers (1, 2) of a pair of rollers is set by the spacing between the bearings (3,5) of the rollers (1, 2) to be such that the printed circuit boards or foils (4) are not deformed beyond the size of the particles (10) adhering to the rollers (1, 2); and

wherein the elevations (7) have rounded front sides (8).

19. (Previously presented) The device of claim 1, wherein the elevations (7) annularly or helically encircle the rollers (1, 2);

wherein the width of the elevations (7) as well as the spacings between the elevations (7) annularly encircling the rollers (1, 2) and the spacings between respective turns of the elevations (7) helically encircling the rollers (1, 2) may range from 2 mm to 200 mm;

wherein the elevations (7) have rounded front sides (8); and

wherein the rollers (1, 2) provided with the elevations (7) are configured to be formed by axles with rings secured thereon in such a manner that the rings are reliably prevented from slipping and twisting.

20. (Previously presented) The device of claim 17, wherein the rollers (1, 2) are lengthened by at least the length of the bordering elevations (9) at the ends of the rollers (1, 2) and are disposed in a processing line in such a manner that the bordering elevations (9) at the ends of the rollers (1, 2) are located outside of a useful area of a conveying path in the processing line occupied by the printed circuit boards or foils (4); and

wherein the rollers (1, 2) provided with the elevations (7) are configured to be formed by axles with rings secured thereon in such a manner that the rings are reliably prevented from slipping and twisting.

21. (Previously presented) The device of claim 1, wherein said elevations (7) are provided along the rollers (1, 2) between said bordering elevations (9) and are arranged between said bordering elevations (9) so that between said bordering elevations (9) regions of the one roller (1) with a large diameter (D') are facing regions of the other roller (2) with a small diameter (d), and regions of the one roller (1) with a small diameter (d) are facing regions of the other roller (2) with a large diameter (D').